

Unit 1:

Algebra and Numbers

Part A

Outcome AN1: Demonstrate an understanding of factors of whole numbers by determining the prime factors; greatest common factor; least common multiple; square root; and cube root.

(this outcome will be covered in Sections 3.1 and 3.2)

3.1 Factors and Multiples of Whole Numbers



LESSON FOCUS

Determine prime factors, greatest common factors, and least common multiples of whole numbers.

Make Connections

In these belts, the patterns are 12 beads long and 40 beads long. How many beads long must a belt be for it to be created using either pattern?



Activate Prior Learning:

Factors and Multiples

A factor is a number that divides exactly into another number.

What are the factors of 30?

The multiples of a number are determined by multiplying the number by 1, 2, 3, 4, and so on, or by skip counting.

What are some multiples of 12?



3.1 Factors and Multiples of Whole Numbers

Activate Prior Learning:

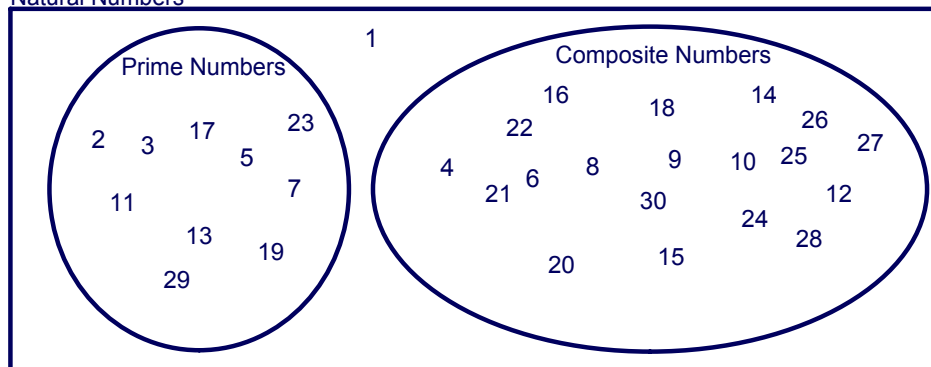
Prime Numbers

A prime number has exactly 2 factors, 1 and itself.

A composite number has more than 2 factors.

Sort these numbers.

Natural Numbers



3.1 Factors and Multiples of Whole Numbers

TRY THIS

Work with a partner.

- List some powers of 2. Make another list of powers of 3.
Pick a number from each list and multiply them to create a different number. What are the factors of this number?
What are some multiples of this number?
- Compare your number to your partner's number.
Which factors do the two numbers have in common?
Which factor is the greatest?
- What are some multiples the two numbers have in common?
Which multiple is the least?
- How can you use the product of powers from Step A to determine the greatest factor and the least multiple that the numbers have in common?

3.1 Factors and Multiples of Whole Numbers

Powers of 2:

$$2, \textcircled{4}, 8$$
$$2^1, 2^2, 2^3 \text{ ————— } 2 \cdot 2 \cdot 2$$

Powers of 3:

$$3, \textcircled{9}, 27$$

$$4 \cdot 9$$
$$36$$

3.1 Factors and Multiples of Whole Numbers

Complete the table.

Product of a power of 2 and a power of 3	Factors	Multiples
36	1, 2, 3, 6, 12, 18, 36	72, 108

Circle the factors that the two numbers have in common.
Which factor is the greatest?

Circle the multiples that the two numbers have in common.
Which multiple is the least?

How can you use the product of powers to determine the greatest factor
and the least multiple that the numbers have in common?

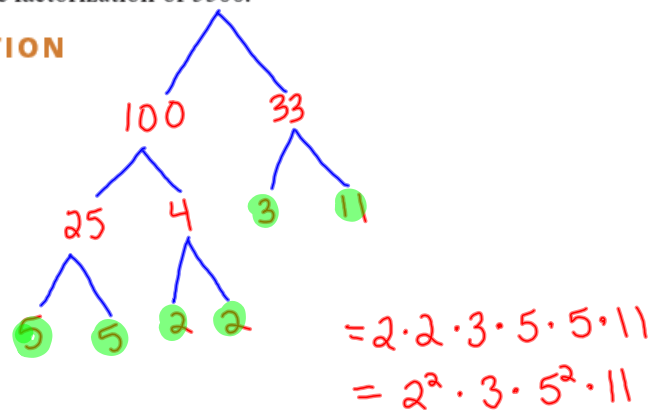
3.1 Factors and Multiples of Whole Numbers

Example 1 Determining the Prime Factors of a Whole Number

Write the prime factorization of 3300.

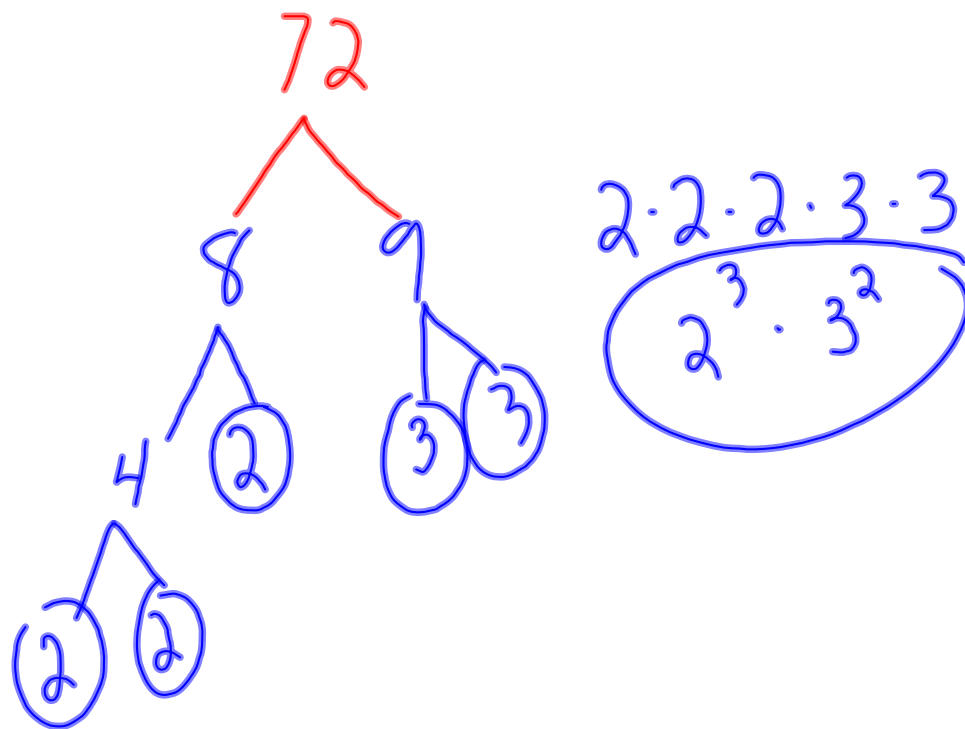
Math_Rocks!

 **SOLUTION**



CHECK YOUR UNDERSTANDING

3.1 Factors and Multiples of Whole Numbers



Monday, September 12th, 2011

- Period 2: Warm-up
- Review the terms: factors, multiples, prime numbers, composite numbers, factor trees, and prime factorization.
- Learn/review the greatest common factor (GCF) and the lowest common multiple (LCM)
- Some notes on all the above terms
- Classwork/Homework

Please Note: There will be a quiz this Friday, September 16 on Sections 3.1 and 3.2 combined. If you need extra help please come see me to schedule a time that we can both meet or stop by at lunch hour.

Warm-up #1

Date:

10

#1 What is a factor?

1

#2 What are the factors of the number 16?

2

#3 Tell me 3 multiples of the number 12.

3

#4 Draw a factor tree for the number 40

4

Warm-up #1

Date:

#1 What is a factor?

A factor is a number that divides exactly into another number.

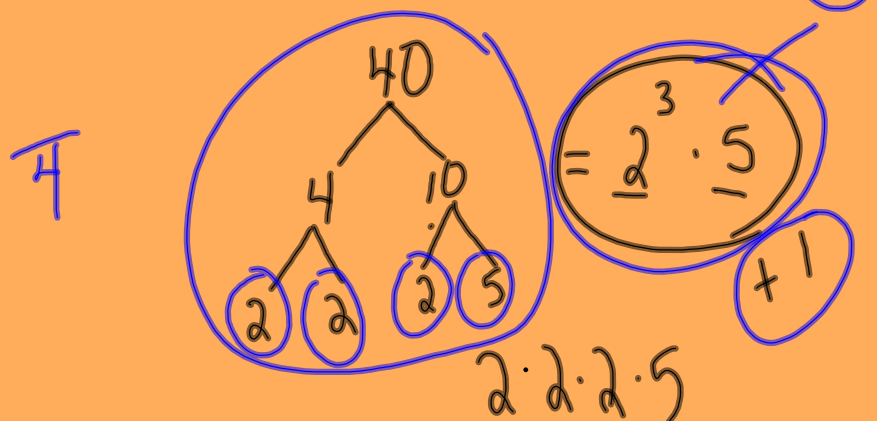
#2 What are the factors of the number 16?

1, 2, 4, 8, 16

#3 Tell me 3 multiples of the number 12.

12, 24, 36, 48

#4 Draw a factor tree for the number 40



factors

multiples

prime numbers

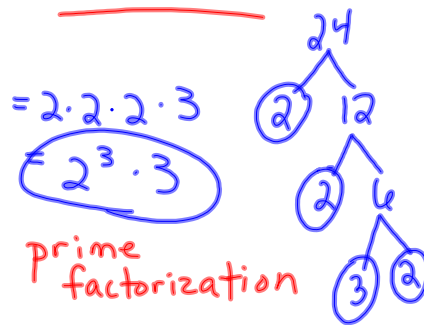
2 factors $\rightarrow 1 + \text{itself}$

Ex. 3
1, 3

composite number

\rightarrow more than 2 factors Ex. 6
1, 2, 3, 6

factor trees



1

This expression is the prime factorization of what number?

A

300

B

~~30~~

C

~~120~~

$$2^2 \cdot 3 \cdot 5^2 \leftarrow$$
$$4 \cdot 3 \cdot 25$$



2

Is this expression
the prime factorization
of 72?



A Yes

B No

$$3^2 \cdot 8$$

$$9 \cdot 8$$

$$72$$

$$3 \cdot 3$$



When a factor of a number has exactly two divisors, 1 and itself, the factor is a *prime factor*.

Factors of 12: 1, 2, 3, 4, 6, 12

?

?

?

?

?



The **prime factorization** of a natural number is the number written as a product of its prime factors.

?

?



3.1 Factors and Multiples of Whole Numbers

Are the numbers 0 and 1 considered prime numbers? Explain.

Possible Answer:

A prime number is described as any number that has only two (positive whole number) factors - itself and 1.

2 is a prime number, since its only factors are 1 and 2.

47 is a prime number, because its only factors are 1 and 47.

1 has only one factor - itself, 1. You multiply 1×1 to get 1, and you can't exactly treat 1 and 1 as separate factors.

0 is a similar story, since it could technically be seen as a number with infinite factors. All you have to do is multiply a number by 0, and you will get 0.

$$3 \times 0 = 0$$

$$0 \times 41 = 0$$

$$144 \times 0 = 0$$

$$21,373,483,879,182,994,121,677,325 \times 0 = 0$$

For 2 or more natural numbers, we can determine their **greatest common factor**.

Example 2 Determining the Greatest Common Factor

Determine the greatest common factor of 138 and 198.



SOLUTION



CHECK YOUR UNDERSTANDING



3.1 Factors and Multiples of Whole Numbers

Example 2 Determining the Greatest Common Factor

Determine the greatest common factor of 138 and 198.

SOLUTIONS

Method 1

Use division facts to determine all the factors of each number.

Record the factors as a “rainbow.”

$$138 \div 1 = 138$$

$$138 \div 2 = 69$$

$$138 \div 3 = 46$$

$$138 \div 6 = 23$$



Since 23 is a prime number, there are no more factors of 138.

$$198 \div 1 = 198$$

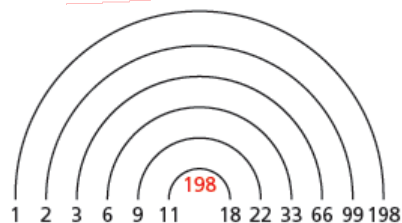
$$198 \div 2 = 99$$

$$198 \div 3 = 66$$

$$198 \div 6 = 33$$

$$198 \div 9 = 22$$

$$198 \div 11 = 18$$

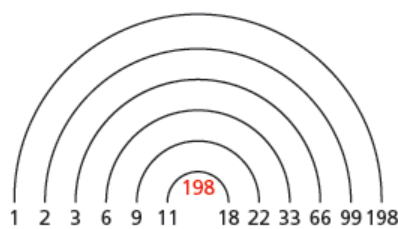


There are no more factors of 198 between 11 and 18.

(Solution continues.)

3.1 Factors and Multiples of Whole Numbers

Example 2 Determining the Greatest Common Factor



The common factors of 138 and 198 are: 1, 2, 3, and 6.

So, the greatest common factor is 6.

Method 2

Check to see which factors of 138 are also factors of 198.

Start with the greatest factor.

The factors of 138 are: 1, 2, 3, 6, 23, 46, 69, 138

198 is not divisible by 138, 69, 46, or 23.

198 is divisible by 6: $198 \div 6 = 33$

The greatest common factor is 6.

(Solution continues.)

3.1 Factors and Multiples of Whole Numbers

Example 2 Determining the Greatest Common Factor

Method 3 (Best way!)

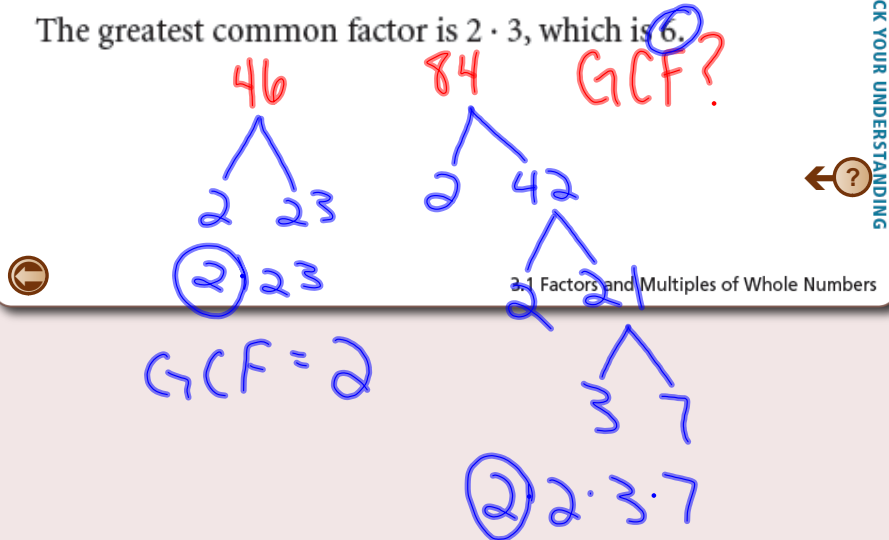
Write the prime factorization of each number.

Highlight the factors that appear in each prime factorization.

$$138 = 2 \cdot 3 \cdot 23$$

$$198 = 2 \cdot 3 \cdot 3 \cdot 11$$

The greatest common factor is $2 \cdot 3$, which is 6.



Classwork/Homework

Please note that any work not completed during class time given is expected to be completed for homework. I may check tomorrow to see that the work was completed. Marks are based on completion (I want to see that you tried your best on every question), not on accuracy (it's ok if you didn't get the answer exactly right!). Therefore, try your best, and make notes of where you are having difficulty!

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#3, 4ac, 5df, 6ac, 8ab, 9a, ~~10ab~~, ~~11a~~

Attachments

Math_Rocks!_Factor_Down_a_Tree.webm